



Rocky Mountain Death Trap: The Mann Gulch Fire

Leadership ViTS
July 2007

Bryan O'Connor
Chief, Safety and Mission Assurance

This and previous presentations are archived at
<https://sma.nasa.gov/safety-messages>



The Firestorm

- On August 4th, 1949 a lightning induced “smoker” started along the south ridge of Mann Gulch, located 20 miles north of Helena, Montana. The fire was spotted the next day and a team of 15 smokejumpers was dispatched.
- The plan was to proceed down the north slope and attack the fire from its rear flank, using the Missouri river as an escape route.
- Unknown to the crew, the fire had jumped across the gulch to the north ridge eliminating the path to safety. Given the very dry conditions, the fire spread rapidly – up to 700 feet per minute.
- Seeing smoke ahead, Foreman Wagner Dodge ordered the team to reverse direction, but the fire quickly caught up to them.



- Dodge lit a intentional burn zone or ‘escape fire’ and urged his men to take refuge. The team ignored Dodge as discipline shattered and it became every man for himself.
- Dodge survived as did two others who made it over the ridge to safety. The rest were overtaken by the fire and died.



US Forest Service Smokejumpers

- **Management Approach:** The Forest Service embraced a low overhead-low cost organizational approach wherein a pool of 150 smokejumpers were used in a rotational fashion.
 - Team members were frequently strangers and seldom had experience with their leaders.
 - Trust in the foreman's plan may have saved the lives of all 15 men.
- **Smokejumper Equipment:** Firefighters wore blue jeans, long sleeved cotton shirts, and baseball caps.
 - Better personal protective equipment could have saved lives.



As a result of the Mann Gulch deaths, the Forest Service developed more robust smokejumper equipment.



Proximate Causes in Event Chain

- Unexpected winds carried the compact fire confined to the south ridgeline over the mouth of the gulch and lower north ridge, closing off both the planned attack and escape routes.
- Steep terrain, strong up-gulch winds, and dry, fast burning fuel allowed the fire to move rapidly up the north ridge overtaking the firefighters.

Causal Web – Underlying Issues

- Inadequate overall smokejumper management approach
 - **Lack of discipline/Inadequate training:** The Forest Service had no formal team development training and individuals had little to no experience working with superiors or team members.
 - **Ignored leadership:** The crew had no experience with intentional burn zones and did not trust or understand the foreman's rescue plan.
 - **Failed communication:** If Dodge had been able to communicate over the noise of the roaring firestorm he may have been able to persuade the men to take cover in the escape fire zone.
- Incomplete understanding of prevailing weather conditions, terrain and likely fire behavior
 - Managers on the scene did indeed define an escape route: once they reached the river and flanked the fire they would have a clear and easy (downhill) retreat path to the Missouri River.
 - The journey from the drop zone to the river had no viable contingency plan.
 - In planning both their attack and retreat strategies, the team leaders did not give adequate consideration to the dynamic nature of fire and weather conditions.



NASA Applicability

Safety and mission success is critically dependent on robust management processes which emphasize:

- The importance of teamwork, communication, training, and trust for crews involved in hazardous ground and space operations
- The need for continual emphasis on team training, operational process discipline, and safety critical decision making
- The need to understand operating environments and the potential for dynamic changes (off nominal behavior)
- The necessity of understanding the physics of possible failures and their consequences, in order to determine if risks have been properly mitigated
- The importance of developing and using proper personal protective equipment for teams working in hazardous environments

